

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

PPC0116 – PRE-CALCULUS

(All sections / Groups)

3 MAR 2020
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 3 pages with 4 questions.
2. Answer all questions.
3. Unless stated otherwise, if an answer is given as a decimal, it should be rounded to **four** significant figures.
4. Write your answers in the Answer Booklet provided.
5. Show all relevant working.

Question 1

- (a) The (gross) price of a road vehicle is RM 35400. This total includes the following:

- the net sales price of the vehicle,
- Tax A of 15%,
- Tax B which is *a fifth* of Tax A.

What was the net sales price of the vehicle before addition of the taxes?

[5 marks]

- (b) Solve the following equation by rearranging and **completing the square**:

$$x = \frac{2x^2 + 2x + 7}{x - 4}.$$

[7 marks]

- (c) The following radical equation is given:

$$\sqrt{2x - 5} - \sqrt{x - 1} = 1.$$

- (i) **Simplify** (but do not solve) the equation to eliminate the radicals. Write your answer in the form $ax^2 + bx + c = 0$. [6 marks]
- (ii) **Without solving**, determine the nature of the possible solutions (i.e., two distinct real solutions, one repeated real solution or two complex solutions). [3 marks]
- (iii) Solve the equation using the quadratic formula and identify the extraneous solution, if any. [4 marks]

Question 2

- (a) Given $f(x) = \sqrt[3]{x}$ and $g(x) = \frac{-x^3+2}{x^6}$:

- (i) Find $(g \circ f)(x)$. [2 marks]
- (ii) Determine the inverse of f , i.e., f^{-1} and verify that $f^{-1}[(f(x))] = x$. [2 + 2 marks]

- (b) Solve the inequality $\frac{3x+1}{x+4} \geq 1$. Obtain your solution using the real number line. [7 + 2 marks]

- (c) Given the polynomial function $f(x) = -x^5 + 4x^3$:

- (i) Find its x - and y -intercepts, if any. [3 marks]
- (ii) At each x -intercept, determine whether the graph touches or crosses the x -axis. [2 marks]
- (iii) What is the maximum number of turning points for f ? [1 mark]
- (iv) Hence, sketch the graph of f . [4 marks]

Question 3

- (a) The exponential growth model $N(t) = 30e^{0.0198026t}$ describes the population of a city, in thousands, t years after 2004. When will the city's population be 60 thousand? [4 marks]

- (b) Solve for x if $\log_2 x + \log_2(x - 3) = 2$. [5 marks]

- (c) Express the following series in summation notation (do not find the sum):

$$\frac{2}{2} + \frac{2^2}{4} + \frac{2^3}{6} + \cdots + \frac{2^{10}}{20}.$$

[3 marks]

- (d) A damped oscillator starts vibrating at 1000 oscillations per second. Every second after that, it makes $4/5$ as many vibrations as the previous second. How many oscillations would it have completed before coming to a stop? [7 marks]
- (e) Expand $(x - 3)^5$ using the binomial theorem. [6 marks]

Question 4

- (a) Solve the following absolute-value inequality and graph the solution set on the real number line:

$$|6t + 10| \geq 3.$$

[4+1 marks]

- (b) The polynomial function $f(x) = 2x^3 + 7x^2 + 5x + 1$ has one rational root.

- (i) Using the **rational root theorem**, find all possible candidates for that root. [4 marks]

- (ii) Show that $x = -1/2$ is the correct root. [2 marks]

- (iii) $f(x)$ is divided by $x + 1/2$. Based on (ii), what is the remainder? [2 marks]

- (c) Find the partial fraction decomposition of

$$f(x) = \frac{3x + 11}{x^2 - x - 6}.$$

[8 marks]

End of Paper

